

**REMARKS**

Claims 1-13 are currently pending in the application. By this amendment, claim 1 is amended and claims 11-13 are added for the Examiner's consideration. The above amendments and added claims do not add new matter to the application and are fully supported by the specification. For example, the added claims 11-13 find support in the specification at pages 7 and 11-12 of the specification. The specification is also revised to correct minor grammatical errors. Reconsideration of the rejected claims in view of the above amendments and the following remarks is respectfully requested.

***Examiner Interview***

Applicants appreciate the courtesies extended to Applicants' undersigned representative by the Examiner during a personal interview conducted on February 17, 2005. During this interview, the rejections over the claims were discussed in detail. As to the 112, 2<sup>nd</sup> paragraph rejection, Applicants' undersigned representative clarified the language in claim 1 and recommended the following language, "as a vehicle stops and a after load applied ahead of the vehicle is released." The examiner appeared to agree that this language both clarifies the claimed invention and overcomes the prior art rejections. Specifically, the claimed invention, as discussed in more detail below, recites a different finishing time by the control unit of brake force distribution control, as compared to the references of record.

***Specification***

The specification was objected to on informalities. The specification has been revised to address the Examiner's concern. Applicants request withdrawal of the objection.

***35 U.S.C. §112, 2<sup>nd</sup> Paragraph, Rejection***

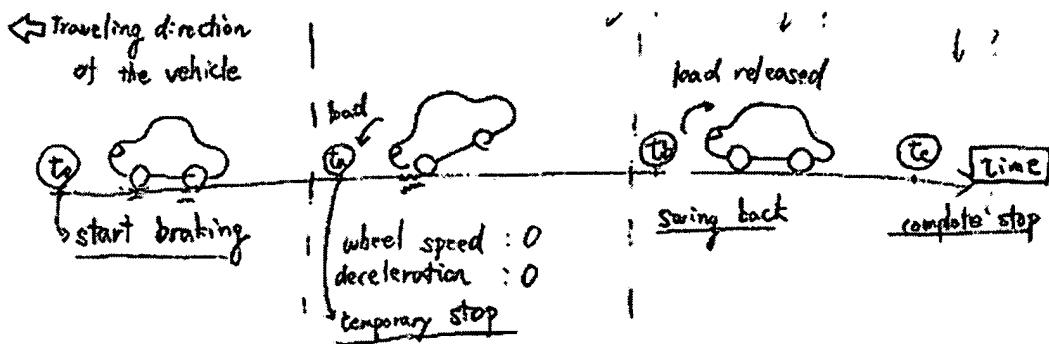
Claims 1-10 were rejected under 35 U.S.C. §112, 2<sup>nd</sup> paragraph. This rejection is respectfully traversed.

Claim 1 is amended in accordance with the agreement reached with the Examiner during the February 17, 2005 interview. Specifically, Applicants submit that the language of claim 1, is clear and definite. In particular, Applicants submit that

“as a vehicle stops and a after load applied ahead of the vehicle is released”

is clear and definite and well supported by the specification. This language also finds support in the specification and is consistent with the remaining claims.

By way of illustration and referring to the Figure reproduced below, at time  $t_a$  a forward force is applied to a driver and the car.



At this time, this forward force provides for a load applied ahead of the vehicle. Since a direction of the forward load of the driver is the same as a direction of a toe force applied to the brake pedal, the toe force is enhanced by the forward force on the driver. When the brake pedal drops, because the driver treads on the brake pedal strongly, the driver will feel uncomfortable which is caused by the pedal drop and would thus surprise the driver because of the automatic motion of the brake pedal. In order to avoid such an uncomfortable situation, according to the present invention, the brake control apparatus finishes the brake force distribution control at swing back (tb); that is, as the moment applied on the vehicle is being reduced to zero, e.g., “as a vehicle stops and a after load applied ahead of the vehicle is

released". This, however, is not a complete stop, as shown above and discussed in further detail below, which occurs at step tc.

Accordingly, Applicants respectfully request that the rejection over claims 1-10 be withdrawn.

### ***35 U.S.C. §102 Rejection***

Claims 1-3 and 10 were rejected under 35 U.S.C. § 102(b) over USPN 5,632,535 Luckevich, et al. Claims 1, 4, 5 and 10 were rejected under 35 U.S.C. § 102(b) over USPN 5,938,299 to Hara, et al. These rejections are respectfully traversed.

#### *Invention*

As discussed during the personal interview, the claimed invention is directed to a brake control apparatus. When a vehicle comes to stop, a required brake force at a front wheel is greater than that at a rear wheel. In order to obtain such brake force distribution, a brake system operates as follows.

1. In a normal state, normally-open-type valves 6A to 6D are opened (see Fig. 1).
2. When the vehicle comes into stop, the normally-open-type valves 6B, 6D at a rear wheel side are closed when a predetermined fluid pressure is applied by a master cylinder M. On the other hand, the other normally-open-type valves 6A, 6C at a front wheel side are kept opened, and the fluid pressure at the front wheel side is continuously increased. Therefore, the fluid pressure applied to the front wheel side becomes greater than the fluid pressure applied to the rear wheel side.
3. When the vehicle stops, the brake system ends the brake force distribution control, and all of the normally-open-type valves are opened. When the valves at the rear wheel side 6B, 6D are opened, due to the pressure difference between the front wheel

side and the rear wheel side, the master cylinder M functions so as to apply even pressure to all of the valves 6A to 6D. Accordingly, a brake pedal, which interlocks with the master cylinder M, is brought into.

When the vehicle is coming to stop, there are 3 steps (see the Figure above). At first, there is a temporary stop step (ta), a wheel speed and deceleration of the vehicle become zero. At this time, a forward load is applied on the vehicle. Second, there is a swing back step (tb), which occurs after a load is applied ahead of the vehicle. After that, the vehicle completely stops (tc).

As discussed above, at time ta, a forward force is applied to a driver. Since a direction of the forward load of the driver is the same as a direction of a toe force applied to the brake pedal, the toe force is enhanced by the forward force on the driver. When the brake pedal drops, because the driver treads on the brake pedal strongly, the driver feels a pedal drop. In order to avoid such an uncomfortable situation, according to the invention, the brake control apparatus finishes the brake force distribution control at swing back (tb). In the step tb, the forward load applied to the driver is released. As a reaction force of the released load, a rearward load is applied to the driver. Since the rearward load shifts the driver's posture, the toe force to the brake pedal is reduced. At this time, the brake control apparatus finishes the brake force distribution control and the driver is unaware of the pedal drop. The vehicle comes to a complete stop at time tc.

In addition, in order to determine the swing back, in claims 2 and 3, the swing back is defined as "after a predetermined time elapsed from when a wheel speed or an estimated vehicle speed is reduced predetermined value", and in the claims 4 and 5, defined as "after an estimated deceleration is reduced to a predetermined value from when an estimated vehicle speed is reduced to a predetermined value".

*Argument over Luckevich*

As discussed during the interview, Luckevich shows a dynamic rear proportioning (DRP) system integrated with an existing vehicle anti-lock braking system (ABS). In the DRP system, the rear brake hydraulic channel(s) can be isolated from the master cylinder by activating the rear isolation valves, provided in the ABS. In the DRP mode, only the valves for the rear wheels are activated. By continually updating control parameters, the system can increase or decrease the rear brake pressure to maintain the optimum brake force balance throughout the braking maneuver. (See, col. 1, lines 25-50.) As further disclosed at cols. 2 and 3, the DRP system of Luckevich, will provide control of rear brake pressure for all braking conditions.

As noted, Luckevich discloses at column 5, line 46 to column 6, line 12, the pedal drop. At col. 6, lines 3-6, Luckevich discloses that

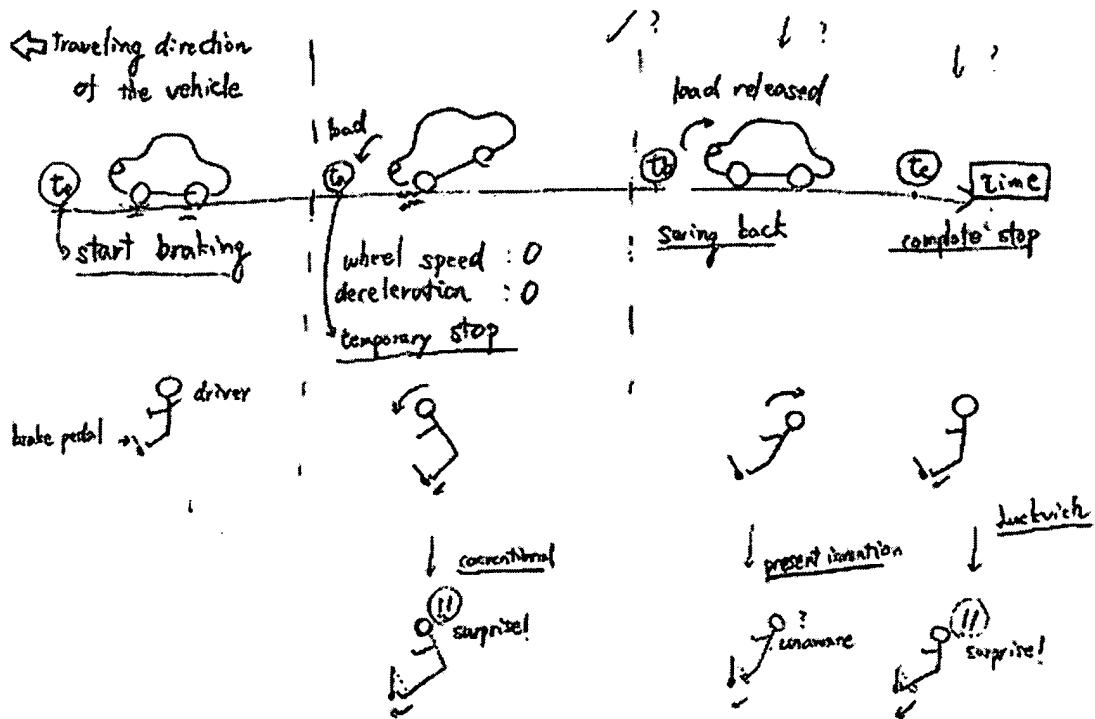
“By imposing a delay, typically on the order of 1 second, there is typically enough time for the vehicle to come to a complete stop and for the driver to relax pressure on the brake pedal”.

This complete stop does not appear to correspond to the swing back condition as recited in the claimed invention. Also, it is noted that the delay to a complete stop results in the driver relaxing pressure on the brake pedal. This would suggest that the control will end when the vehicle is at a complete stop, not at a condition after the load has just been released. So, Luckevich does not appear to disclose that the control unit finishes the brake force distribution control as a vehicle stops and after a load applied ahead of the vehicle is released.

Thus, in Luckevich, the control would appear to be finished at the complete stop of the vehicle, which would be the very last “vehicle” representation in the figure below. Also, if the brake force distribution control finished its control at the complete stop (tc), since the driver generally keeps treading on the brake pedal at stopping, the driver would still easily recognize the pedal drop and would feel uncomfortable. That is, as shown below, the driver will still feel the pedal drop at time tc, which will result in the same uncomfortable feeling prevented by the

invention. Therefore, Applicants believe that the claimed invention is not anticipated by Luckevich since this reference discloses the brake force distribution control ends at  $t_c$ , contrary to the claimed invention.

**Luckevich**



As to the dependent claims, Applicants submit that claims 1-3 and 10 depend from distinguishable base claim 1. Thus, these claims are also in condition for allowance. Accordingly, Applicants respectfully request that the rejections over claims 1-3 and 10 be withdrawn.

*Argument over Hara*

In contrast to the claimed invention, Hara discloses that the termination condition of the braking force distribution control is, “when the estimated body velocity or deceleration becomes smaller than a predetermined value” (column 7, lines 50-56). There is simply no description concerning the pedal drop or the swing back. Moreover, Hara is silent about imposing a predetermined time before finishing the brake force distribution control. Since the swing back is detected by combination of the velocity and the deceleration, Applicant believes the present invention has non-obviousness over Hara.

To terminate, the termination condition of the braking force control process 103 is disclosed at col. 3, lines 40-56. At the termination, after one of the conditions at col. 3, lines 40-56 are met, the termination condition includes turning off the retaining solenoid valves 14 and 15 provided in the oil hydraulic circuit of the rear wheels, thereby effecting changeover from the retaining mode to the normal mode. (See, col. 7, lines 57-61.) In the normal mode, as described at col. 3, lines 56-65, the retaining solenoid valve 14 and the pressure-reducing solenoid valve 18 both are off, so that the retaining solenoid valve 14 is in the open state while the pressure-reducing solenoid valve 18 is in the close state.

As to the dependent claims, Applicants submit that claims 4, 5 and 10 depend from distinguishable base claim 1. Thus, these claims are also in condition for allowance.

Accordingly, Applicants respectfully request that the rejections over claims 1, 4, 5 and 10 be withdrawn.

***35 U.S.C. §103 Rejection***

Claims 6-8 are rejected under 35 U.S.C. § 103(a) over Luckevich. Claim 9 is rejected under 35 U.S.C. § 103(a) over Hara. These rejections are respectfully traversed.

Applicants submit that claims 6-9 are dependent claims, originating from distinguishable base claim 1. Applicants thus submit that these claims are also in condition for allowance.

Applicants further submit that these claims are also non-obvious on their own merits. In Luckevich, even though the 1 second disclosed in Luckevich is a predetermined time, such a

time is much longer than that recited and contemplated by the present invention. As described in claims 6 and 7, the predetermined time is about 300 msec. If 1 second was counted from before t3 (referring to figure 2 of the present specification), the estimated vehicle speed is more than 600 km/h which is much faster than 2km/h of the present invention (claims 8 and 9).

Accordingly, Applicants respectfully request that the rejections over claims 6-9 be withdrawn.

***Other Matters***

Claims 11-13 are added for the Examiner's consideration. These claims are distinguishable over the references of record.

Claims 11 and 12 define the swing back aspect of the invention. This is clearly distinguishable over the references of record, as discussed above.

Independent claim 13 recites a brake pressure controlling unit which includes a control unit executing an anti-lock brake control to resolve a lock tendency of the wheels by controlling the operation of the brake pressure controlling unit according to a result of judgment of the lock tendency of the wheels, and executing a brake force distribution control distributing the front and rear brake forces by controlling the normally-open-type electromagnetic valves in correspondence with the rear wheels to close in such a manner that the normally-open-type electromagnetic valves are opened when the brake force distribution control is finished. The control unit finishes the brake force distribution control as a vehicle stops and a after load applied ahead of the vehicle is released.

**CONCLUSION**

In view of the foregoing amendments and remarks, Applicants submit that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Applicant hereby makes a written conditional petition for extension of time, if required. Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 23-1951.

Respectfully submitted,



Andrew M. Calderon  
Registration No. 38,093

McGuireWoods, LLP  
Suite 1800  
1750 Tysons Blvd.  
McLean, VA 22102  
(703) 712-5426